Combustible Dust Issues

Presented by Keith Reissig, Industrial Hygienist

Hazard Recognition

- Always the key to the game!
  - Dust Hazard?

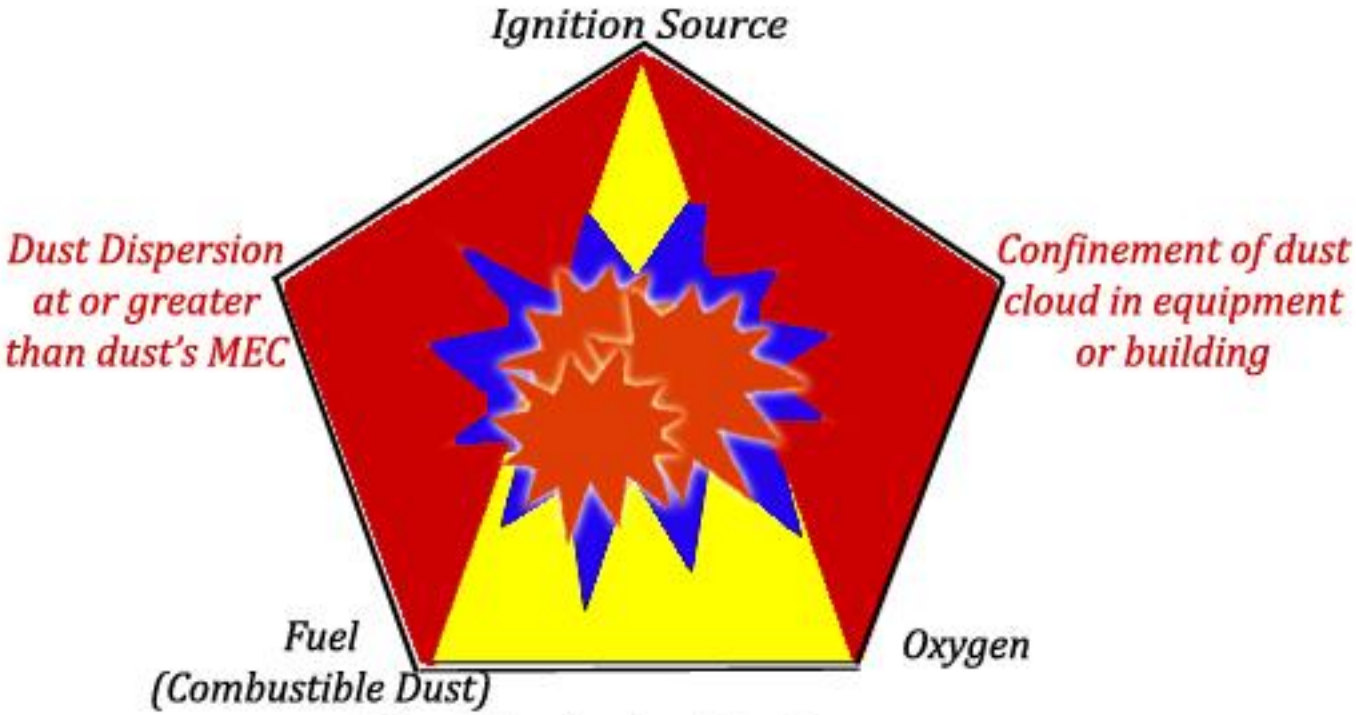
Hazard Recognition

- How about now?

Hazard Recognition

- What about here?

The Basic Requirements for an EXPLOSION

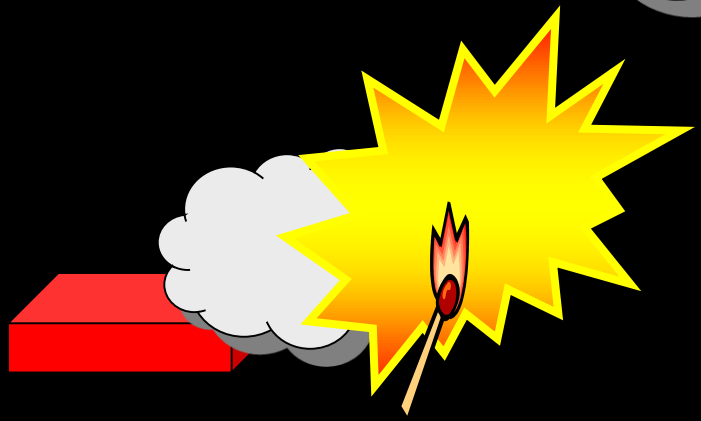


Dust Explosion Pentagon

Dust explosion in a work area

Dust settles on flat surfaces

Some event disturbs the settled dust into a cloud



Dust cloud is ignited and explodes

At Risk?

- Perform an assessment and identify if...
  - The material is combustible when finely divided
    - Will the material ignite and combust

At Risk?

- These dusts include, but are not limited to:
  - Metal dust such as steel, aluminum, and magnesium
  - Wood dust
  - Coal and other carbon dusts
  - Plastic dust and additives
  - Biosolids
  - Other organic dust such as sugar, flour, cocoa, paper, soap, and dried blood
  - Certain textile materials

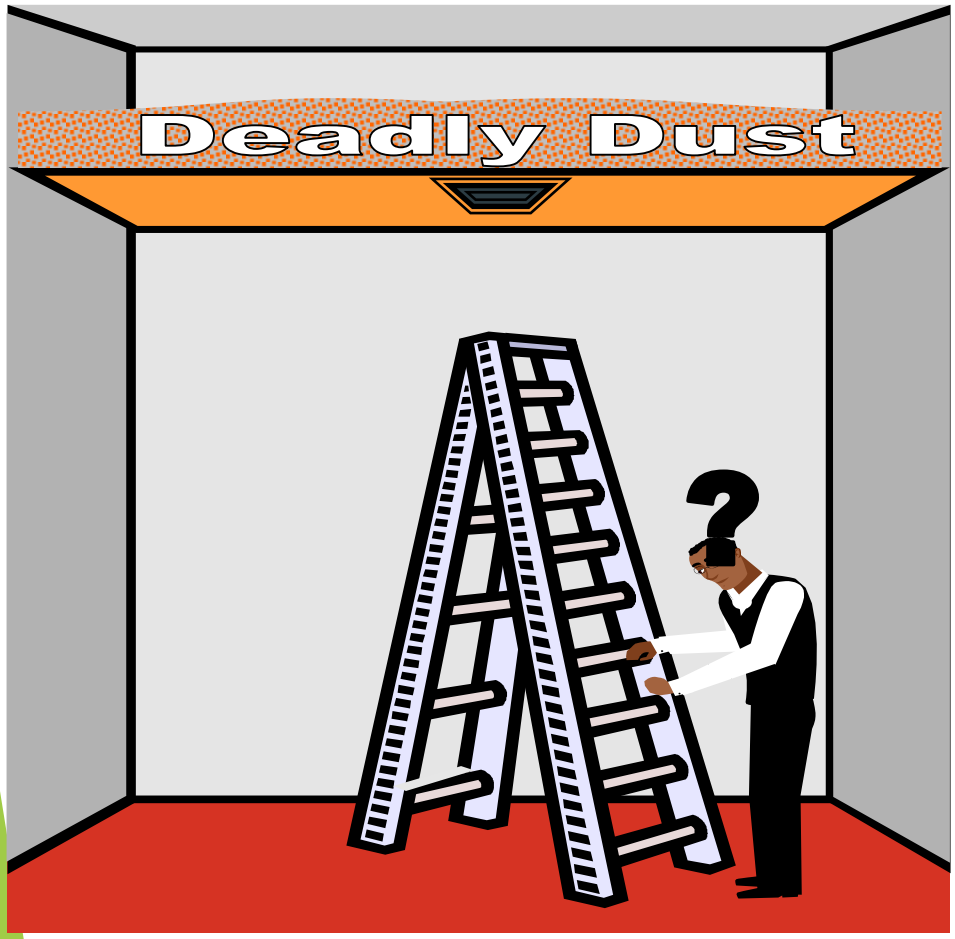
At Risk?

- Perform an assessment and identify if...
  - A process can produce finely divided materials
    - *The hazard increases as the particle size decreases*

At Risk?

- Perform an assessment and identify if...
  - There are areas where dust may build up
    - Look up and down for flat surfaces

At Risk?



- Perform an assessment and identify...
  - Hidden areas where dust may collect unnoticed
    - Inside equipment
    - Suspended ceilings

At Risk?

- Perform an assessment and identify if...
  - Any methods that may cause the finely divided material to become suspended in the air

At Risk?

- Rules of thumb
  - Can you write in it?
  - Does it obscure the color of the surface?
  - Is it thicker than a paper clip

    (1/32nd of an inch)?

Hazard Control – Fuel

- Can the material be changed?
  - Particle size
  - Shape
  - Moisture content
  - Changes caused by process equipment
- Use different sources to determine combustibility
- Test data
  - As used
  - Chemical supplier
- MSDS sheet information
- Published tables

Hazard Control – Fuel

Agricultural Products
Egg white
Milk, powdered
Milk, nonfat, dry
Soy flour
Starch, corn
Starch, rice
Starch, wheat
Sugar
Sugar, milk
Sugar, beet
Tapioca
Whey
Wood flour

Agricultural Dusts
Alfalfa
Apple
Beet root
Carrageen
Carrot
Cocoa bean dust
Cocoa powder
Coconut shell dust
Coffee dust
Corn meal
Cornstarch
Cotton
Cottonseed
Garlic powder
Gluten
Grass dust
Green coffee
Hops (malted)
Lemon peel dust
Lemon pulp
Linseed
Locust bean gum
Malt
Oat flour
Oat grain dust
Olive pellets
Onion powder
Parsley (dehydrated)
Peach
Peanut meal and skins
Peat
Potato
Potato flour
Potato starch
Raw yucca seed dust
Rice dust
Rice flour
Rice starch
Rye flour
Semolina
Soybean dust
Spice dust
Spice powder
Sugar (10x)
Sunflower
Sunflower seed dust
Tea
Tobacco blend
Tomato
Walnut dust
Wheat flour
Wheat grain dust
Wheat starch
Xanthan gum

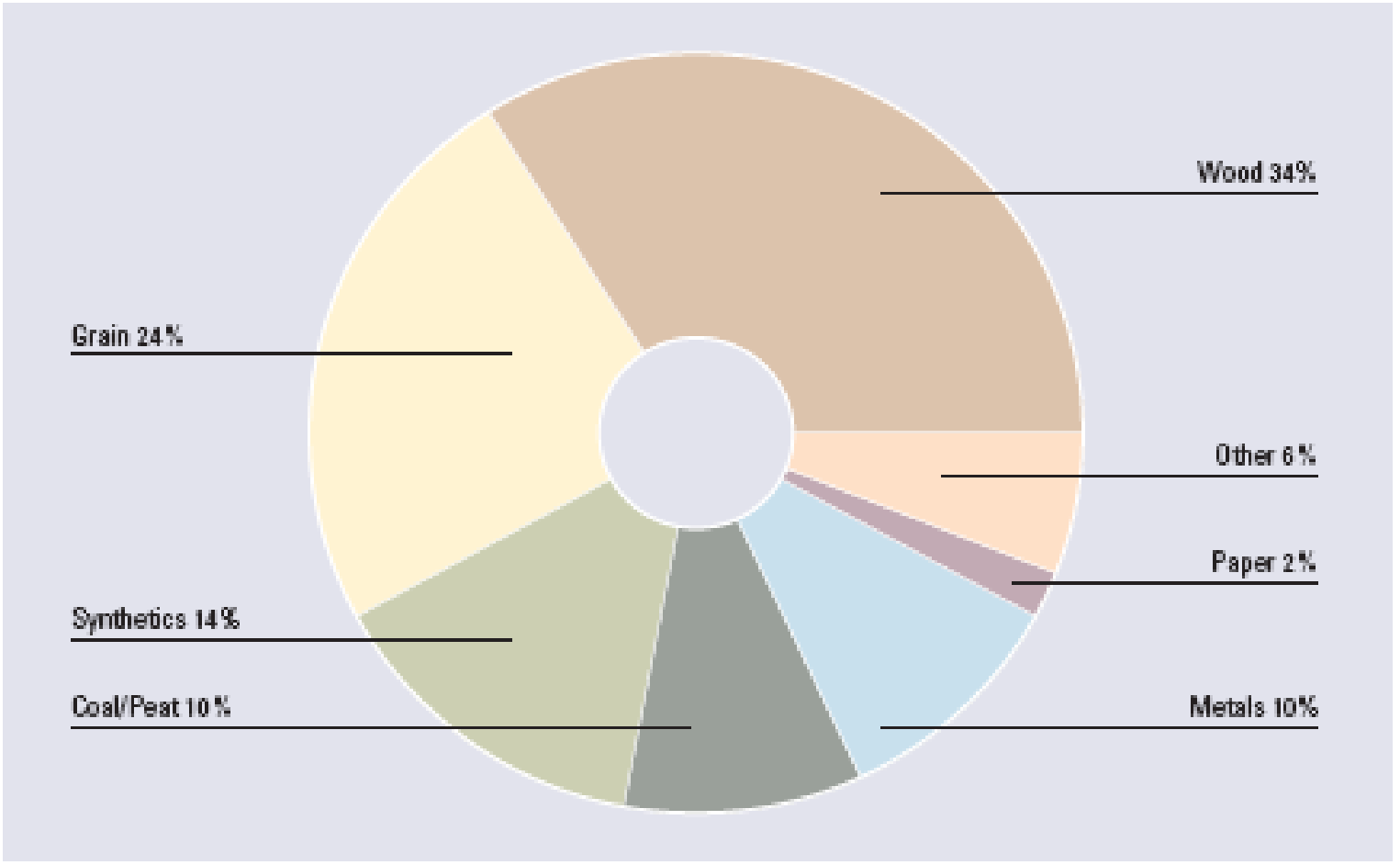
Carbonaceous Dusts
Charcoal, activated
Charcoal, wood
Coal, bituminous
Coke, petroleum
Lampblack
Lignite
Peat, 22% H_20
Soot, pine
Cellulose
Cellulose pulp
Cork
Corn

Chemical Dusts
Adipic acid
Anthraquinone
Ascorbic acid
Calcium acetate
Calcium stearate
Carboxy-methylcellulose
Dextrin
Lactose
Lead stearate
Methyl-cellulose
Paraformaldehyde
Sodium ascorbate
Sodium stearate
Sulfur

Metal Dusts
Aluminum
Bronze
Iron carbonyl
Magnesium
Zinc

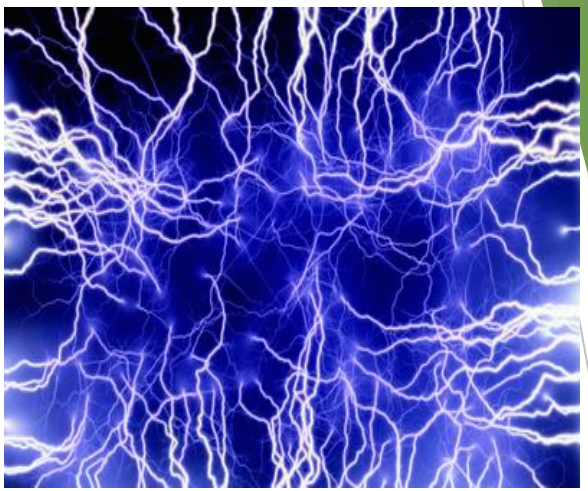
Plastic Dusts
(poly) Acrylamide
(poly) Acrylonitrile
(poly) Ethylene (low-pressure process)
Epoxy resin
Melamine resin
Melamine, molded (phenol-cellulose)
Melamine, molded (wood flour and mineral filled phenol-formaldehyde)
(poly) Methyl acrylate
(poly) Methyl acrylate, emulsion polymer
Phenolic resin
(poly) Propylene
Terpene-phenol resin
Urea-formaldehyde/ cellulose, molded
(poly) Vinyl acetate/ ethylene copolymer
(poly) Vinyl alcohol
(poly) Vinyl butyral
(poly) Vinyl chloride/ ethylene/vinyl acetylene suspension copolymer
(poly) Vinyl chloride/ vinyl acetylene emulsion copolymer

Hazard Control – Fuel



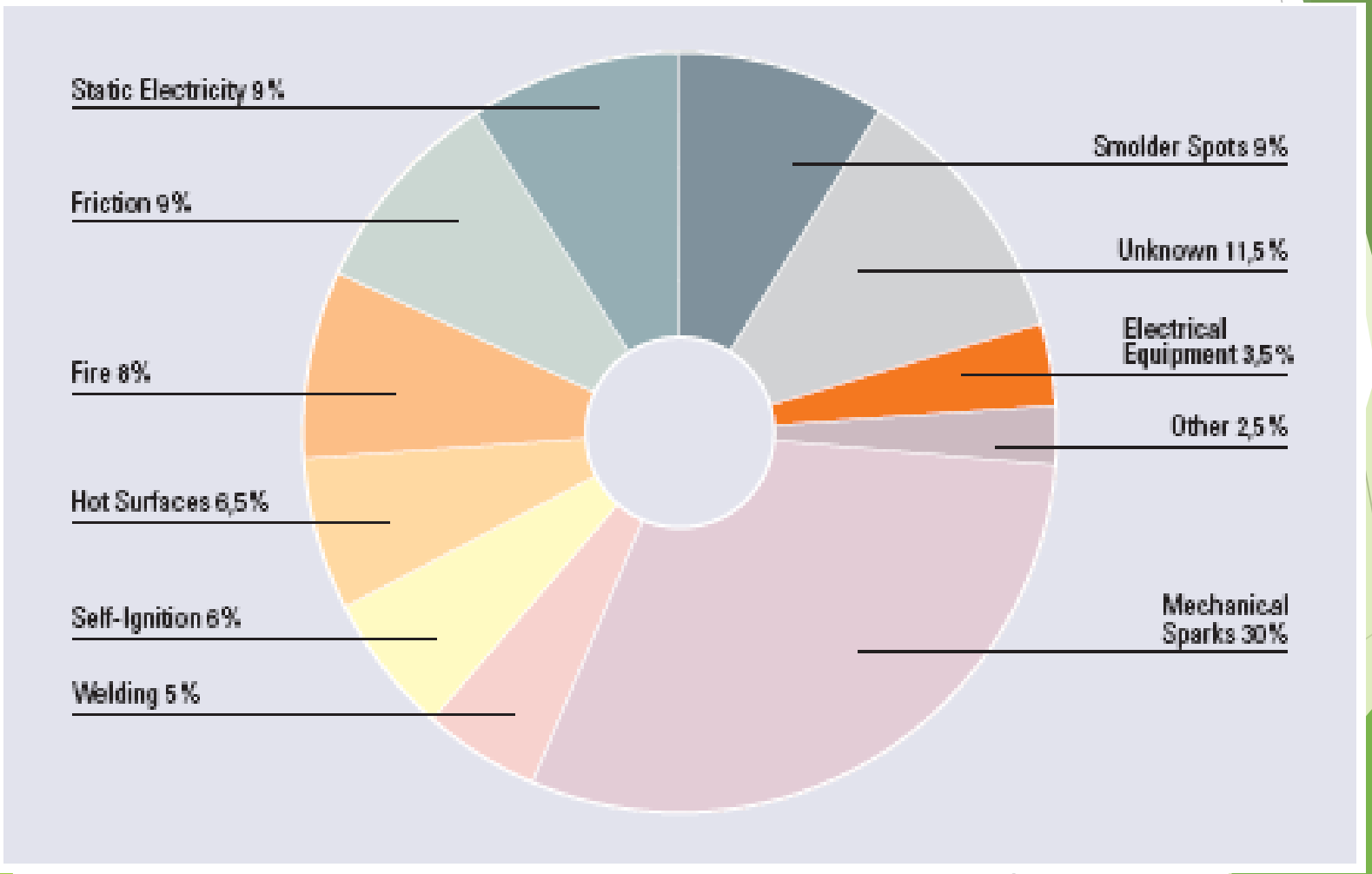
Hazard Control – Ignition

- Use appropriate electrical equipment and wiring methods (Class I & II)



- Control
  - Static electricity
  - Smoking
  - Open flame
  - Sparks
  - Other hot work

Hazard Control – Ignition



Hazard Control – Ignition

- Adequately maintain equipment in dusty areas
- Proper type of industrial trucks
- Proper use of cartridge-activated tools

Hazard Control – Confinement

- Can the process be moved to a less confined area?
- Provide access to all hidden areas to permit inspection
- Inspect areas regularly
- Clean areas regularly

Hazard Control – Oxygen

Sorry,
still enjoy
breathing!

Hazard Control – Dispersion

- Minimize the escape of dust from process equipment
- Use dust collection systems
- Use surfaces that minimize dust accumulation

Training – Employees

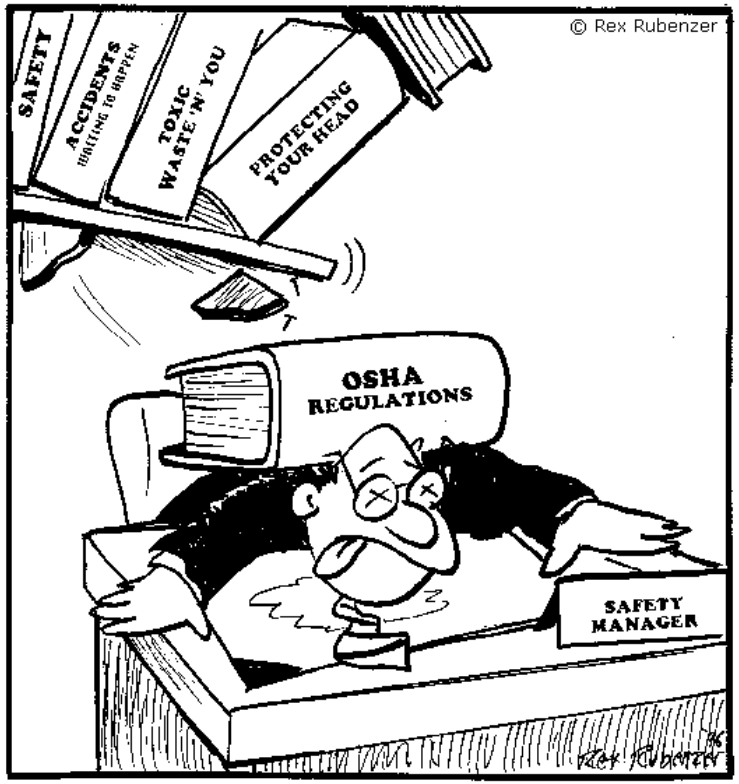
- Recognize and prevent hazards
- Empowered to take preventative action
- How to alert management to a hazard

Training – Employees

- Safe work practices and procedures for their job tasks
- Must take place ***before*** an employee starts work as a part of HazCom

Training – Managers

- Understand it to be a hazard
- Have qualified personnel conduct a facility analysis
- Develop a prevention and protection program tailored to the operation



Regulations Concerning Combustible Dusts

- OSHA
  - General Duty Clause
  - 1910.22 – General Requirements: Housekeeping
  - 1910.38 – Emergency Action Plans
  - 1910.94 – Ventilation
  - 1910.272 – Grain Handling Facilities
  - 1910.307 – Hazardous (classified) Locations (for electric equipment)
  - 1910.1200 – Hazard Communication
- International Code Council's *International Fire Code*

Regulations Concerning Combustible Dusts

- NFPA
  - NFPA 61 – Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
  - NFPA 68 – Guide for Venting of Deflagrations
  - NFPA 69 – Standard on Explosion Prevention Systems
  - NFPA 70 – National Electrical Code
  - NFPA 484 – Standard for Combustible Metals, Metal Powders, and Metal Dusts
  - NFPA 495 – Explosive Materials Code

Regulations Concerning Combustible Dusts

- NFPA (Continued)
  - NFPA 499 – Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
  - NFPA 654 – Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
  - NFPA 664 – Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

Questions?